

LIVING WITH A STAR – A PERSPECTIVE ON PRIORITIES 4/4/01

Priority

1. Solar Influences on Global Change.

Why: Global change is the single most important environmental problem facing humanity. This issue involves major national and international policies because of the potential economic impacts of global change and/or mitigation actions.

Key issues for LWS:

- Determine how and why the Sun varies (for assessment of past & future role in global climate change).
- Identify and understand mechanisms by which solar variability affects climate (and possibly weather).

Need: Past, present, future behavior.

2. Space Environmental “climate” data (e.g., specification models)

Need:

- For design of cost-effective systems with minimal or no sensitivity to space weather.
- The goal is to have economical “all weather” systems -- not to be dependent on predictions.

2. Nowcasting Space Environment

Need: For rapid anomaly resolution for space and communication/navigation systems; astronaut safety.

Why: If anomaly is known space environmental effect, can “reboot” and get back in operation.
If unknown cause, may have to do detailed failure analysis requiring system to be down for long time.
Astronaut can move to shielded area for significant radiation events.

3. **Prediction of:**

a) Solar Proton Events (astronaut safety, especially for deep space)

Need:

- Reliable warnings (minimize false alarm rate).
- Forecast of “all clear” periods for EVA’s; being away from “radiation storm cellar” in deep space (e.g. when doing surface excursions).

b) Prediction of geomagnetic storms for applications where effective mitigation is possible (e.g. electric power grid).

Need:

- Reliable forecasts (storm is coming) and very reliable shorter term (\geq hour) warnings to minimize taking unnecessary mitigation by reducing capacity, etc. which can reduce system efficiency.

c) Predictions of space environment for operation and utilization of space systems.

Need:

- To reliably forecast availability/accuracy/sensitivity of communication and navigation systems susceptible to space weather (e.g. ionospheric scintillations).
- To have more operators on call and/or to avoid uploads of software/critical commands during times of extreme space weather (SEU probability, etc.).